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Indian Standard

SPECIFICATION FOR
SUPER HEAT DUTY FIRECLAY REFRACTORIES

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Indian Standard

SPECIFICATION FOR SUPER HEAT DUTY FIRECLAY REFRACTORIES

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Indian Standard

SPECIFICATION FOR SUPER HEAT DUTY FIRECLAY REFRACTORIES

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 30 November 1978, after the draft finalized by the Refractories Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 Need for formulating a separate standard for fireclay refractories meeting the requirements of steel plants was felt as the existing Indian Standards on fireclay refractories, that is, IS : 6-1967*, IS : 7-1967†, and IS : 8-1967‡ were not sufficient to meet their special needs. The Sectional Committee after considering their requirements decided to prepare a separate standard for super heat duty fireclay refractories, to cover the requirements of steel plants.

0.3 It is to be pointed out that though a number of tests have been prescribed in this standard, it is not intended that all of them should be carried out in each case, as by a judicious application of some of the tests it should be possible to judge the quality of bricks in a given lot. However, the tests to be conducted in each case would depend upon the service conditions for which the bricks are required, and purchasers are advised to indicate these conditions at the time of placing an indent or order.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960§. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for super heat duty burnt fireclay refractories for general purposes.

*Specification for moderate heat duty fireclay refractories, group A (*third revision*).

†Specification for moderate heat duty fireclay refractories, group B (*third revision*).

‡Specification for high heat duty fireclay refractories (*third revision*).

§Rules for rounding off numerical values (*revised*).

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 4041-1967* shall apply.

3. SUPPLY OF MATERIAL

3.1 General requirements relating to the supply of super heat duty fireclay refractories shall be as laid down in IS : 1387-1967†.

3.2 The refractories shall be compact, of homogeneous texture and free from cracks, voids and other flaws. They shall be burnt evenly throughout, shall have no soft corners and have sufficient mechanical strength.

4. SAMPLING

4.1 Representative samples shall be drawn according to the scheme of sampling given in IS : 1528 (Part VII)-1974‡ for carrying out tests specified in the standard.

5. TOLERANCE ON SIZE

5.1 Variations from specified dimensions, covering both warpage and shrinkage shall be allowed to the extent of ± 1 percent or ± 1.5 mm whichever is greater.

6. CHEMICAL COMPOSITION

6.1 Refractories, when tested in accordance with the relevant methods given in IS : 1527-1972§ and IS : 1335-1959||, shall contain not less than 40 percent alumina and not more than 2.5 percent iron oxide (Fe_2O_3).

6.2 Provided that such of the physical properties like refractoriness under load and linear changes after re-heating, which are considered essential for the particular service condition, are satisfactory, the stipulation regarding alumina content may be waived off subject to agreement between the purchaser and the manufacturer.

7. PYROMETRIC CONE EQUIVALENT (SOFTENING POINT)

7.1 When determined in accordance with the methods given in IS : 1528 (Part I)-1974¶ the refractories shall have a pyrometric cone equivalent (PCE) of not less than Standard Pyrometric Cone (ASTM) No. 33.

*Glossary of terms relating to refractory materials.

†General requirements for the supply of metallurgical materials (*first revision*).

‡Methods of sampling and physical tests for refractory materials: Part VII Methods of sampling and criteria for conformity (*first revision*).

§Methods for chemical analysis of high silica refractory materials (*first revision*).

||Methods for the direct determination of alumina in refractory materials (*tentative*).

¶Methods of sampling and physical tests for refractory materials: Part I Determination of pyrometric cone equivalents (PCE) (*first revision*).

8. REFRACTORINESS UNDER LOAD

8.1 When tested according to the method given in IS : 1528 (Part II)-1974*, the refractories shall have t_a not less than 1450°C.

9. APPARENT POROSITY

9.1 When tested in accordance with the method given in IS : 1528 (Part VIII)-1974† the apparent porosity of the refractories shall not be more than 20 percent by volume.

9.1.1 In case of special shapes to be hand moulded, the requirements shall be decided between the purchaser and the manufacturer.

10. COLD CRUSHING STRENGTH

10.1 When tested in accordance with the method given in IS : 1528 (Part IV)-1974‡ the cold crushing strength of refractories shall be not less than 19.613 MN/m² (200 kgf/cm²).

11. SPALLING RESISTANCE

11.1 If required, the refractories shall be tested for spalling resistance requirements as mutually agreed to between the purchaser and the manufacturer.

12. PERMANENT LINEAR CHANGE

12.1 When tested at 1450°C in accordance with the method given in IS : 1528 (Part VI)-1974§ the permanent linear change of refractories shall be not more than 0.4 percent.

13. MARKING

13.1 Each refractory brick or shape shall be clearly marked with the manufacturer's name or trade-mark.

*Methods of sampling and physical tests for refractory materials: Part II Determination of refractoriness under load (*first revision*).

†Methods of sampling and physical tests for refractory materials: Part VIII Determination of apparent porosity (*first revision*).

‡Methods of sampling and physical tests for refractory materials: Part IV Determination of cold crushing strength (*first revision*).

§Methods of sampling and physical tests for refractory materials: Part VI Determination of permanent change after reheating (*first revision*).

13.1.1 The brick or shape may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

INDIAN STANDARDS

ON

REFRACTORIES

IS:

- 6-1967 Moderate heat duty fireclay refractories, group A (*third revision*)
- 7-1967 Moderate heat duty fireclay refractories, group B (*third revision*)
- 8-1967 High heat duty fireclay refractories (*third revision*)
- 195-1963 Fireclay mortar for laying fireclay refractory bricks (*second revision*)
- 483-1972 Fireclay refractories for oil-fired boiler furnaces of naval ships (*first revision*)
- 484-1958 Silica refractories for general purposes (*revised*)
- 1292-1958 Mortar for laying silica bricks
- 1335-1959 Methods for the direct determination of alumina in refractory materials (*tentative*)
- 1522-1967 Fireclay glass tank blocks (*first revision*)
- 1523-1972 Bottom-pouring refractories for steel plants (*first revision*)
- 1524-1968 Refractory sleeves (*first revision*)
- 1525-1968 Ladle refractories for steel plants (*first revision*)
- 1526-1960 Sizes and shapes for firebricks (230 mm series)
- 1527-1972 Methods for chemical analysis of high silica refractory materials (*first revision*)
- 1528 Methods of sampling and physical tests for refractory materials:
 - 1528 (Part I)-1974 Determination of pyrometric cone equivalents (PCE) or softening point (*first revision*)
 - 1528 (Part II)-1974 Determination of refractoriness under load (*first revision*)
 - 1528 (Part III)-1974 Determination of spalling resistance (*first revision*)
 - 1528 (Part IV)-1974 Determination of cold crushing strength (*first revision*)
 - 1528 (Part V)-1974 Determination of modulus of rupture (*first revision*)
 - 1528 (Part VI)-1974 Determination of permanent change after reheating (*first revision*)
 - 1528 (Part VII)-1974 Methods of sampling and criteria for conformity (*first revision*)
 - 1528 (Part VIII)-1974 Determination of apparent porosity (*first revision*)
 - 1528 (Part IX)-1974 Determination of true specific gravity and true density (*first revision*)
 - 1528 (Part X)-1974 Determination of sizes of refractory bricks (*first revision*)
 - 1528 (Part XI)-1974 Determination of warpage (*first revision*)
 - 1528 (Part XII)-1974 Determination of bulk density (*first revision*)
 - 1528 (Part XIII)-1974 Determination of resistance to disintegration effect of carbon monoxide (*first revision*)
 - 1528 (Part XIV)-1974 Sieve analysis (*first revision*)
- 1529-1971 Blast furnace refractories for steel plants (*first revision*)
- 1748-1961 Sizes of graphite crucibles
- 1749-1972 Magnesite refractories (*first revision*)
- 1750-1961 Dead-burned pea magnesite
- 1751-1968 Fireclay cupola refractories (*first revision*)
- 2042-1972 Insulating bricks (*first revision*)
- 2043-1963 Siliceous fireclay refractories
- 2044-1962 Sillimanite refractories for glass melting tank furnaces
- 2045-1962 Natural sillimanite blocks for glass melting tank furnaces
- 3304-1965 Burnt magnesite-chrome refractories for general purposes
- 3305-1965 Burnt chrome-magnesite refractories for general purposes
- 4041-1967 Glossary of terms relating to refractory materials
- 4564-1968 Fireclay nozzles
- 4565-1968 Fireclay stoppers
- 4801-1968 Chemically-bonded magnesite-chrome refractories for roof lining
- 4812-1972 Silica refractories for coke oven (*first revision*)
- 4813-1968 Chemically-bonded chrome-magnesite refractories for general purposes
- 4814-1968 Chemically-bonded magnesite-chrome refractories for general purposes
- 5495-1969 Sizes and shapes for firebricks (300 mm and higher series)
- 6727-1972 Fireclay checker-bricks for open-hearth furnace
- 6728-1972 Recuperator tubes, tiles and collars for soaking pits in steel plants
- 7199-1974 Blast furnace stove refractories